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past four years by the Lake Superior Division of the United States Geological Survey.[1] The results of this work have not been published and any reference to the conclusions reached would be premature. In general it may be stated that now, as in the past, there is divergence in the conclusions reached by the Minnesota Survey and by the United States Geological Survey concerning the position and importance of the unconformities, correlation of series, and nomenclature.

C. K. LEITH.

The Norwegian Polar Expedition, 1893 to 1896. Scientific Results. Edited by FRIDTJOF NANSEN. Vol. I. Longmans, Green, & Co.

The object of the report of which this is the first volume is stated in the preface to be "to give in a series of separate memoirs a complete account of the scientific results of the Norwegian North Polar Expedition of 1893 to 1896." The first volume contains the following papers: "The Fram," 16 pp. with three plates; "The Jurassic Fauna of Cape Flora, Franz Josef Land," by J. F. Pompeckj, with a "Geological Sketch of Cape Flora and its Neighborhood," by Fridtjof Nansen, 147 pp. with three plates; "Fossil Plants from Franz Josef Land," by A. G. Nathorst, 26 pp. with two plates; "An Account of the Birds," by Collett and Nansen, 53 pp. with two plates; "Crustacea," by G. O. Sars, 137 pp. with thirty-six plates.

The fossil fauna brought back from Cape Flora was collected by Nansen during the period of his stay with Jackson at Elmwood, Cape Flora, Franz Josef Land. The collection was studied by J. F. Pompeckj, whose descriptions of the fossils constitute the second part of the volume. Collections from the same localities secured by the Jackson-Harmsworth expedition were examined and described by Mr. E. T. Newton, but the conclusions reached by Pompeckj and by Newton as to the age of the strata are somewhat at variance.

The condition of preservation of the fossils is poor, and many species, particularly of lamellibranchs, could not be identified even generically. The collection shows that a fauna of at least twenty-six different species occurs in the Jurassic sediments about Cape Flora.

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[1] The reports on this area in preparation by the survey are: Lake Superior Iron Ores, to appear in the Twenty-first Annual Report; Monograph on the Vermilion Iron Bearing District of Minnesota, and Monograph on the Mesabi Iron District of Minnesota.

The collections of the Jackson-Harmsworth expedition from the same region only afforded fourteen species, and seventeen of the species studied by Pompeckj were not recorded by Newton. The fossils were found at five localities, and at three of these they were *in situ*. From the results of his study of the Jackson-Harmsworth collections, Newton concluded that the "Lower Oxfordian rocks," and probably the equivalent of the "British Kellaway rocks," are represented in the Jurassic strata underlying the basalt at Cape Flora. Pompeckj, however, was able to identify four horizons in a much more definite manner. The lowest of these is Bajocian, and probably the lower Bajocian; the second is Lower Callovian, the zone of *Macrocephalites macrocephalus;* the third is the Middle Callovian, the zone of *Cadoceras milaschewici;* and the fourth is Upper Callovian, the zone of *Quenstedtoceras lamberti.* The Bajocian fauna is apparently without analogy in the arctic region, but seems to show direct affinities with the central European Jura. The Callovian faunas are very near those of the Russian Callovian, and these two regions were probably in direct communication during that part of Jurassic time. It is worthy of note that there is hardly any likeness between the fauna of Cape Flora and that of Cape Stuart, East Greenland.

In the fossils, one rather striking feature is the paucity of gastropods, one species only having been found in the marine fauna, while cephalopods and lamellibranchs are relatively much more abundant. This general relation also holds for the arctic fauna of northern Europe.

The identification of these beds at Cape Flora gives the northernmost locality of Jurassic beds, since the latitude of Cape Flora is nearly 10° farther north than that of the next most northerly deposit of this age. These beds show that the Bajocian sea of north Europe extended far to the northward. Spitzbergen was probably not covered; neither was Novaja Semlja, and these two islands were probably connected with each other and with Europe. This land area may have been extended northward to Franz Josef Land. The sea seems to have lain north and west of this land. The Petchora Basin sea is conjectured to have extended north between Spitzbergen and Novaja Semlja, and to have been bounded on the north by land in the region of Franz Josef Land. Spitzbergen is conjectured to have been connected with the Franz Josef Land of the Callovian epoch. The Callovian sea is conjectured to have extended east to Alaska. Toward the end of the Callovian epoch the sea receded to the southward from Franz Josef Land, while Spitzbergen and Novaja Semlja were partly submerged.

The main body of the sedimentary Jura of Cape Flora extends from sea level up to 575 feet. It is fossiliferous in horizons only. The Callovian part of the Jura extends from 370 feet to 575.

The fossil plants secured by Nansen, also from the region about Cape Flora, were placed in the hands of A. G. Nathorst, and his report upon them constitutes Part III of the volume. These plant remains are all fragmentary and very poorly preserved, so that in most instances no specific identification could be made. Out of the twenty-nine forms recognized, only two are specifically identified with certainty, though seven others are compared with described species. The conclusions reached by Nathorst as to the age of the plant-bearing deposit is that "it was formed toward the close of the Jurassic or commencement of the Cretaceous period, without our being able at present to settle which." The fossil plants occur in two beds which lie between certain of the seven extrusive basaltic flows.

The account of the birds is divided into four sections, the first treating of the journey along the north coast of Siberia; the second gives the observations made while the "Fram" was drifting with the ice before Nansen left it; the third gives the observations made during the sledge journey of Nansen and Johansen; while the fourth gives the observations made on the "Fram" after Nansen left it in March 1895. This section of the report is a technical description of the species of birds seen.

The section on the Crustacea is in much detail and will be of great interest and value to zoölogists. The conclusion is reached that the bulk of the pelagic animals found in the North Polar basin were derived from the west through the Atlantic current flowing in beneath the superficial Siberian current. It has also been found that forms which have hitherto been regarded as quite southern in distribution are found in the polar sea.

The volume also makes some announcement of the contents of future volumes of the report. The second volume is announced to contain "The Astronomical Observations and their Results," "Terrestrial Magnetism," and "Pendulum Observations and their Results." The third volume will deal with "The Oceanography of the North Polar Basin," "Hydrometers and their Errors, especially those caused by the Variation of the Surface Tension of Liquids," "The Depths and Submarine Features of the North Polar Basin, with chemical Analyses and Microscopical Composition of the Deep Sea Deposits," "Diatomaceæ and Algæ living on the Drifting Ice and in the Sea of the North Polar Basin." Many other memoirs are announced for still later volumes. It is stated that the number of volumes will probably be five or six, which it is hoped may be finished in the course of about two years. These volumes will not only furnish a large body of information about a little-known region, but some of them will deal with questions of world-wide application. The reports are to be issued in the English language only.

R. D. S.

The Pleistocene Geology of the South Central Sierra Nevada, with especial reference to the Origin of the Yosemite Valley. By HENRY WARD TURNER. Proceedings of the California Academy of Sciences. Third Series, Vol. I, No. 9; 9 Plates; pp. 361–321.

This paper gives a brief outline of the pre-Pleistocene orogenic history of the Sierra Nevada, the orogenic movements of the Pleistocene, and a brief sketch of the Pleistocene history of the region, as an introduction to the discussion of the origin of the Yosemite Valley. The Sierran period, the period of high lands preceding glaciation, is included in the Pleistocene. Some brief notes on the glacial period are also given, and the conclusion reached that there were two periods of glaciation separated by an interval of deglaciation, though the evidence on this point is not looked upon as altogether conclusive. The assumption that in the interior of the continent there were two (and not more) well-marked glacial epochs, needs to be modified in the light of the investigations of the last few years. The brief statement concerning the cause of the glacial period, also seems not to take account of the latest and most satisfactory views on this subject.

The several hypotheses which have been advanced concerning the origin of the Yosemite are considered, and the conclusion reached that this valley was not scooped out by the ice (Muir); that it is not a river-cut canyon, the walls of which were made vertical by the sapping action of ice (Johnson); and that there is no adequate evidence that it is due to a drop fault (Whitney, *et. al.*); but that it owes its origin to river